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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/719,113

11/20/2003

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TUC920030146US1

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05/01/2006

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EXAMINER

SZETO, JACK W

ART UNIT

PAPER NUMBER

2113

DATE MAILED: 05/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/719,113	Applicant(s) CHEN ET AL.	
	Examiner Jack W. Szeto	Art Unit 2113	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 13-15 and 25-27 is/are rejected.
- 7) ☒ Claim(s) 4-12, 16-24, 28-36 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Non-Final Official Action

Status of the Specification and Claims

Claims 25-36 are rejected under 35 U.S.C. 101.

Claims 1-3, 13-15, and 25-27 are rejected under 103(a).

Claims 4-12, 16-24, and 28-36 are objected to as being dependent upon rejected base claims but contain allowable subject matter.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 25-36 are rejected under 35 U.S.C. 101 as claiming non-statutory subject matter.

As per the specification, on page 7, lines 13-30, Applicant defines the article of manufacture may comprise of transmission media. Code on a transmission media is not tangible subject matter, thus these claims are non-statutory

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claim 1-3, 13-15, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanai (United States Patent No. 6,502,205), and further in view of Shah (United States Patent No. 6,766,470) and Ryle (United States Patent Publication No. 2005/0010849).

As per claim 1, Yanai discloses:

A method, comprising:

monitoring paths between a first controller and second controller [column 29, lines 13-24: link between controllers monitored];

determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable;

indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period; and

indicating the path in a second failed state if the path has not been unavailable for the predetermined time period.

Yanai does not disclose:

determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable;

indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period; and

indicating the path in a second failed state if the path has not been unavailable for the predetermined time period.

Ryle disclose:

determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable [para 0008: transport path failure is timed to determine whether fault is transient or permanent];

indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period [para 0008: transport path failure is timed to determine whether fault is transient or permanent (first failed state)]; and

indicating the path in a second failed state if the path has not been unavailable for the predetermined time period [para 0008: transport path failure is timed to determine whether fault is transient (second failed state) or permanent].

Yanai discloses a system of mirroring data using two storage system controllers. Part of this mirroring includes sending data between both controllers through a link [Yanai, Figure 1, reference 40 and column 8, lines 25-38: fiber optic link or SONET networks]. While Yanai discloses monitoring the links (paths) between the two systems, it does not disclose using a predetermined time period to determine a failure state. Ryle, on the other hand, discloses monitoring SONET paths between two systems for errors and whether these errors are transient or nontransient based on time. Ryle's motivation for distinguishing between transient and nontransient errors is for inadvertent disabling of the local Fibre Channel port. While this specific motivation may not apply for Yanai, the general motivation does (not overacting to a transient error). This motivation is further augmented by Shah [column 1, lines 20-23: allows for automatic recovery from transient failure]. Distinguishing between transient and nontransient

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errors allows for more efficient fault recovery. Usually transient errors are temporary and can be “waited out” and nontransient errors cannot be “waited out”. Knowing which error type exist allows for the user to implement an efficient recovery plan without overacting to transient errors. Thus it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the method of distinguishing a transient error based on time as taught in Ryle into the backup storage systems of Yanai to create a system where error recovery can be efficiently handle.

As per claim 2, Yanai discloses:

The method of claim 1, further comprising:

indicating the path in a functioning state if the path is determined to be available [column 29, lines 14-15: communication continues on available link (inherent that link is in the functioning state)].

As per claim 3, Ryle discloses:

The method of claim 1, wherein the first failed state comprises a permanent failed state and the second failed state comprises a transient failed state [para 0008: transport path failure is timed to determine whether fault is transient (second failed state) or permanent/nontransient (first failed state)].

As per claim 13, Yanai discloses:

A system, comprising:

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a first controller [figure 1];

a second controller [figure 1];

paths between the first and second controller [figure 1];

code executed by the first controller to perform [column 8, lines 18-23: service processor on primary data storage system provides monitoring, repair...etc]

(i) monitoring paths between a first controller and second controller [column 29, lines 13-24: link between controllers monitored];

(ii) determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable;

(iii) indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period; and

(iv) indicating the path in a second failed state if the path has not been unavailable for the predetermined time period.

Yanai does not disclose:

(ii) determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable;

(iii) indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period; and

(iv) indicating the path in a second failed state if the path has not been unavailable for the predetermined time period.

Ryle disclose:

(ii) determining whether one path has been unavailable for a predetermined time period in response to detecting that the path is unavailable [para 0008: transport path failure is timed to determine whether fault is transient or permanent];

(iii) indicating the path in a first failed state if the path has been unavailable for more than the predetermined time period [para 0008: transport path failure is timed to determine whether fault is transient or permanent (first failed state)]; and

(iv) indicating the path in a second failed state if the path has not been unavailable for the predetermined time period [para 0008: transport path failure is timed to determine whether fault is transient (second failed state) or permanent].

Yanai discloses a system of mirroring data using two storage system controllers. Part of this mirroring includes sending data between both controllers through a link [Yanai, Figure 1, reference 40 and column 8, lines 25-38: fiber optic link or SONET networks]. While Yanai discloses monitoring the links (paths) between the two systems, it does not disclose using a predetermined time period to determine a failure state. Ryle, on the other hand, discloses monitoring SONET paths between two systems for errors and whether these errors are transient or nontransient based on time. Ryle's motivation for distinguishing between transient and nontransient errors is for inadvertent disabling of the local Fibre Channel port. While this specific motivation may not apply for Yanai, the general motivation does (not overacting to a transient error). This motivation is further augmented by Shah [column 1, lines 20-23: allows for automatic recovery from transient failure]. Distinguishing between transient and nontransient errors allows for more efficient fault recovery. Usually transient errors are temporary and can be

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“waited out” and nontransient errors cannot be “waited out”. Knowing which error type exist allows for the user to implement an efficient recovery plan without overacting to transient errors. Thus it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the method of distinguishing a transient error based on time as taught in Ryle into the backup storage systems of Yanai to create a system where error recovery can be efficiently handle.

Claim 25 contain the same subject matter as claim 1. Claim 25 is the “article of manufacture” interpretation of claim 1. Thus, claim 1 will be used as an example for the rejection of claim 25.

Claim 14 contain the same subject matter as claim 2. Claim 14 is the “code executed on the first controller” interpretation of claim 2. Thus, claim 2 will be used as an example for the rejection of claim 14.

Claim 26 contain the same subject matter as claim 2. Claim 26 is the “article of manufacture” interpretation of claim 2. Thus, claim 2 will be used as an example for the rejection of claim 26.

Claim 15 contain the same subject matter as claim 3. Claim 15 is the “code executed on the first controller” interpretation of claim 3. Thus, claim 3 will be used as an example for the rejection of claim 15.

Claim 27 contain the same subject matter as claim 3. Claim 27 is the “article of manufacture” interpretation of claim 3. Thus, claim 3 will be used as an example for the rejection of claim 27.

Allowable Subject Matter

Claims 4-12, 16-24, and 28-36 are objected to as being dependent upon rejected base claims, but would be allowable if rewritten in independent form including all the limitations in their respective base claims and any intervening claims.

Only claims 4-12 will be listed as the other claims are just different interpretation of the same subject matter. The italicized segments indicate subject matter which overcome prior art.

As per claim 4:

The method of claim 1, further comprising:

receiving a write request;

returning fail to the write request in response to determining that all paths are in the first failed state; and

queuing the write request in a queue in response to determining that at least one path is in the second failed state and no paths are indicated in a functioning state.

As per claim 5:

The method of claim 4, further comprising: submitting the write request to one path indicated in the functioning state to transmit to the secondary controller in response to determining that at least one path is in the functioning state.

As per claim 6:

The method of claim 4, wherein at least one primary volume managed by the primary controller and at least one secondary volume managed by the secondary controller are designated as volume pairs, wherein writes to one primary volume in one volume pair is copied to the corresponding secondary volume in the volume pair, further comprising:

suspending one volume pair including the primary volume to which the write request is directed in response to determining that all paths are in the first failed state.

As per claim 7:

The method of claim 4, further comprising:
periodically processing the queue and write requests queued therein; and
submitting the write requests in the queue to one path indicated in the functioning state to transmit to the secondary controller in response to determining that at least one path is in the functioning state

As per claim 8:

The method of claim 4, further comprising:
indicating a time the write request was received when queuing the write request in the queue; and
returning fail to one write request in the queue in response to determining that the write request has been queued longer than a request timeout period.

As per claim 9:

The method of claim 8, further comprising:

periodically processing the queue and write requests queued therein to determine whether to return fail to those write requests queued longer than the request timeout period.

As per claim 10:

The method of claim 9, further comprising:

determining whether at least one path is in a functioning state when periodically processing the queue, wherein fail is only returned to those write requests having been queued longer than the request timeout period in response to determining that no path is in the functioning state.

As per claim 11:

The method of claim 1, further comprising:

receiving a read request to access requested data;
returning the requested data with the first controller in response to determining that the data is available at a first storage coupled to the first controller;
determining that the requested data is not available at the first storage;
returning fail to the read request in response to determining that all paths are in the first failed state in response to determining that the data is not available at the first storage; and
queuing the read request in a queue to transfer to the secondary controller to access the requested data from a second storage in response to determining that at least one path is in the second failed state and no paths are indicated in a functioning state in response to determining

that the data is not available at the first storage.

As per claim 12.

The method of claim 1, further comprising:

performing a failover to the second controller to service I/O requests through the second controller in response to detecting a failure related to the first controller;

logging updates made by the second controller during the failover;

transferring logged updates from the second controller to the primary controller in response to a failback to the first controller;

returning fail to the transfer of one logged update to the first controller in response to determining that all paths are in the first failed state; and

queuing one logged update to transfer to the first controller in a queue in response to determining that at least one path is in the second failed state and no paths are indicated in a functioning state.

As per claims 4-11, *the method of queuing the write/read request if there are no paths in a functioning state and if at least one path is in a second failed state.* The examiner is unable to find prior art which discloses this limitation. Yanai discloses queuing (buffering) write/read requests [column 29, line 40 to column 30, line 40] if all the links are “downed” and the requests will be sent at a later time when at least one link is available. However, Yanai does not mention the path being in a second failed state (which is a path being unavailable for less than a predetermined time). Also, there are various prior art that retries sending messages when a

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system is in a transient error state, however these prior art does not disclose the other limitations in claims 1 and 4 and the Examiner is unable to find sufficient motivation to combine. While it may be obvious to distinguish a failed state using time (as discussed above), it is not obvious to implement this specific method of fault handling/recovery as disclosed in claims 4 and 11.

As per claim 12, the method of *queuing one logged update to transfer to the first controller in a queue in response to determining that at least one path is in the second failed state and no paths are indicated in a functioning state*. Like claims 4 and 11, the Examiner is able to find similar art which discloses failover of controllers, logging requests, and then synchronizing once there is recovery, however, the examiner is unable to find sufficient motivation to combine the method of queuing the logged updates when a path is in the second failed state. Thus claims 4-12 contain allowable subject matter.

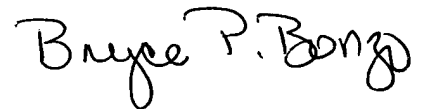
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack W. Szeto whose telephone number is (571) 272-1537. The examiner can normally be reached on M-F 8 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jws



BRYCE P. BONZO
PRIMARY EXAMINER